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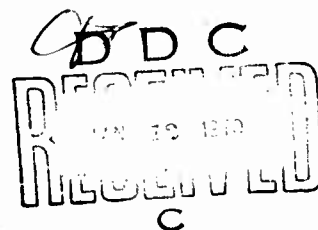
AD *(20)*
RDT&E Project No. Not Available
USATECOM Project No. 8-WE-307-072-001
Report No. APG-MT-3434

FINAL LETTER REPORT ON
PRODUCT IMPROVEMENT TEST OF
NIGHT SIGHT FOR M72A1 LAW

BY

J. F. SANBORN

JANUARY 1970



ABERDEEN PROVING GROUND
ABERDEEN PROVING GROUND, MARYLAND

ACCESSION	DATE	BY	REMARKS
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DEPARTMENT OF THE ARMY
ABERDEEN PROVING GROUND Mr. Sanborn/bm/234-
ABERDEEN PROVING GROUND MARYLAND 21005 3350-4180

8 JAN 1970

STEAP-MT-TI

SUBJECT: Final Letter Report on Product Improvement Test of Night Sight
for M72A1 LAW, RDT&E Project No. Not Available, USATECOM
Project No. 8-WE-307-072-001, Report No. APG-MT-3434

Commanding Officer, Pacific
Picatinny Arsenal
ATTN: SMUPA-DC4
Dover, New Jersey 07801

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1. REFERENCES:

a. Letter, STEAP-MT-TI, 27 June 1969, subject: Proposed Plan Outline
for Product Improvement Test of Night Sight for M72A1 LAW; with 1st Ind,
SMUPA-DC4, 23 July 1969, subject: same as above.

b. Letter, SMUPA-DC4, 13 November 1969, subject: Product Improvement
Test of Limited Light Sight for M72A1 LAW System.

2. BACKGROUND:

A need for a limited-light aiming capability for the 66-mm antitank
rocket (LAW) was identified in Viet Nam. In response to this need the
M46E1 sight was developed to replace the standard front sighting device
presently used with the LAW. The M46E1 sight is nearly identical to the
presently used sight except that the 100-meter and 150-meter reference
marks on the sight are painted with 3 millicuries of encapsulated Pro-
methium 147 to provide 80 microlamberts of illumination for distinct
visibility in limited light. The reticle of the sight is laminated
between two sheets of plastic to prevent the loss of radioactive material.

The M46E1 sight (bare and on LAW systems) was subjected to a series
of environmental and rough handling subtests which simulated exposure
to extreme climatic conditions and severe mechanical shocks. The test
program was designed to meet the requirements of the Atomic Energy
Commission as well as the requirements of the US Army Test and Evaluation
Command.

STEAP-MT-TI

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Project No. 8-WE-307-072-001, Report No. APG-MT-3434

The test reported herein was performed to evaluate the safety characteristics of the sight under conditions of rough handling, transportation and vibration, drop, and adverse climatic conditions.

The testing at Aberdeen Proving Ground was performed from September through November 1969.

3. OBJECTIVE:

The objective of this test was to determine if the M46E1 sight is safe for use on the M72A1 LAW.

4. RESULTS:

Table I briefly describes the individual test procedures and results. Inclosure 1 provides a detail description of each subtest.

Table I. Results of Tests of Night Sight for M72A1 LAW

Test	Procedure	Results	Wipe Test ^a	
			Before	After
Initial inspection		Satisfactory	Neg	-
High temperature storage, +145°F, 48 hours		Satisfactory	Neg	Neg
Low temperature storage, -50°F, 48 hours		Satisfactory	Neg	Neg
Transportation - vibration	MTP 4-2-804; at -50°F and +145°F	Satisfactory	Neg	Neg
Rough handling	(ref Inclosure 1)	Overpacks damaged; satisfactory	Neg	Neg
Forty-foot drop	MIL-STD-331, test 103	Overpacks damaged; satisfactory	Neg	Neg
Salt spray	MIL-STD-331, test 107	Satisfactory	Neg	Neg

^aEach test sight was wiped with filter paper all over its surface before and after each test. Less than 2200 disintegrations per minute must be measured on the paper (USAEC Rules and Regulations, Title 10, Part 32).

STEAP-MT-TI

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Project No. 8-WE-307-072-001, Report No. APG-MT-3434

Table I (Cont'd)

Test	Procedure	Results	Wipe Test ^a	
			Before	After
Temperature shock	MIL-STD-331, test 113	Satisfactory	Neg	Neg
Sand and dust	MIL-STD-331, test 116	Slight sight fogging; satis- factory	Neg	Neg
Fungus	MIL-STD-331, test 110	Satisfactory	Neg	Neg
Humidity	MTP 4-2-820 (Interim Pamphlet 70-84), par. 4.2	Satisfactory	Neg	Neg
Weathering	Water immer- sion, salt spray, temperature- shock, sand and dust, fungus, humidity (USAEC Rules and Regulations, Title 10, Part 32)	Satisfactory	Neg	Neg
Shock	USAEC Rules and Regu- lations, Title 10, Part 32, par. 32.40 (b)	Slight delamination of covering plastic; satis- factory	Neg	Neg
Immersion	USAEC Rules and Regu- lations, Title 10, Part 32, par. 32.4	Satisfactory	Neg	Neg

^aEach test sight was wiped with filter paper all over its surface before and after each test. Less than 2200 disintegrations per minute must be measured on the paper (USAEC Rules and Regulations, Title 10, Part 32).

STEAP-MT-TI

SUBJECT: Final Letter Report on Product Improvement Test of Night Sight
for M72A1 LAW, RDT&E Project No. Not Available, USATECOM
Project No. 8-WF-307-072-001, Report No. APG-MT-3434

The M46E1 sight on the M72A1 LAW was found to be safe under all test conditions described herein. No leakage of radioactive material was noted throughout the test program. During the shock test, however, some delamination of the plastic covering of the sight was noted, but after 100 drops it did not progress to the area of the radioactive material (ref Inclosure 1).

The test sights met each of the criterion for the individual tests for durability and safety.

5. CONCLUSIONS:

It is concluded that the M46E1 sight is safe under the extreme climatic and rough physical handling conditions tested for the intended use.

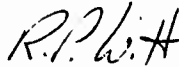
6. RECOMMENDATIONS:

Not applicable.

FOR THE COMMANDER:

2 Incls

1. Section 2. Details of Test
2. Correspondence



R. P. WITT
Associate Director
Materiel Testing Directorate

STEAP-MT-TI

SUBJECT: Final Letter Report on Product Improvement Test of Night Sight
for M72A1 LAW, RDT&E Project No. Not Available, USATECOM
Project No. 8-WE-307-072-001, Report No. APG-MT-3434

Copies furnished:

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Cmdr, DDC for Scientific & Tech Infor, Cameron Station, Alexandria,

Va 23314, ATTN: Document Service Center (20 cys)

SECTION 2. DETAILS OF TEST

2.1 INITIAL INSPECTION

2.1.1 Objective

The objective of this inspection is to determine the physical properties and condition of the sights, as received, for testing.

2.1.2 Criterion

The sights shall be in a useable condition (Materiel Testing Directorate) (MTD).

2.1.3 Method

The LAW rocket systems that contained the test sights were unpacked and examined for physical condition. All mounted sights were wiped in the manner accepted for radioactive materials. The wipes were read for radioactivity by the US Army Environmental Hygiene Agency (USAEHA), Edgewood Arsenal.

All bare test sights were unpacked, examined, and wipe tested.

2.1.4 Results

All sights, both mounted and bare, were in a condition acceptable for testing. The radioactive levels of the wipes taken of the sights were below the maximum level of disintegration per minute, DPM (2200) required by the Atomic Energy Commission (AEC) Rules and Regulations, Part 32, par. 32.40 e.

2.1.5 Analysis

The M46E1 limited light sights met the criterion of the initial inspection.

2.2 HOT AND COLD STORAGE

2.2.1 Objective

The objective of this subtest was to determine the susceptibility of the sight to damage upon exposure to extreme temperatures.

2.2.2 Criterion

There shall be no adverse effects to the sights as a result of their exposure to extreme temperatures (MTD).

2.2.3 Method

Fifteen LAW rocket systems, with test sights mounted, were exposed to a temperature of -50°F for a 48-hour period. Fifteen other systems were exposed to +145°F for a 48-hour period. The items were then examined for effects of temperature.

2.2.4 Results

An examination of all test items by means of a Geiger-Mueller (G-M) survey meter and a wipe test revealed no leakage of radioactive material. No physical damage to any part of the sight was noted.

2.2.5 Analysis

The M46E1 sight met the criterion of the high and low temperature storage test.

2.3 TRANSPORTATION - VIBRATION

2.3.1 Objective

The objective of this subtest was to determine if the M46E1 sight could withstand the effects of transportation - vibration with no damage that would effect its usefulness or safety.

2.3.2 Criterion

The sight shall remain safe to handle and be functional after exposure to a simulated transportation - vibration environment (MTD).

2.3.3 Method

The test items from the high- and low-temperature storage were used for the transportation - vibration test. The LAW rocket systems with test sights were packed 5 each per cardboard overpack. In each end of the overpack resilient foam plastic blocks of approximately 2-inch thickness served to hold the LAW launchers in a particular orientation as well as to separate the individual rounds. Three overpacks (15 systems) were placed in each of 2 wooden-crate type containers for vibration at 2 different temperatures. The 15 systems that were conditioned at -50°F during the temperature storage test were vibrated at -50°F during this test. The same procedure was followed with the systems stored at +145°F.

The 2 containers of LAW systems were vibrated in each of 2 axes in accordance with MTP 4-2-804 to simulate 1000 miles of 2-wheel trailer transportation and 3 hours of aircraft transportation. The temperature of the test items was monitored during the test with thermocouples.

2.3.4 Results

The sights completed the test program in the same physical condition in which they began the test. No leakage of radioactive material was evident by a survey with a G-M meter or by the wipe test.

2.3.5 Analysis

The objective of this subtest was met and the M46E1 sight complied with the requirements stated in the criterion.

2.4 ROUGH HANDLING

2.4.1 Objective

The objective of this subtest was to determine if the M46E1 sight could withstand the effects of the rough handling environment with no damage that would effect safety or usability.

2.4.2 Criterion

The sight shall remain safe and functional after exposure to a rough handling environment (MTD).

2.4.3 Method

The rough handling test was performed as a sequential test in three rough handling subtest phases. i.e., 7-foot packaged drop test, bump test, and five-foot unpackaged drop test (Figure 2.4-1). As indicated in Figure 2.4-1, a portion of the test items were removed from the test lot of 48 rounds after the first two subtests for firing. At the completion of the test all items were fired to determine the effects of firing on the sight.

Each of the test items was conditioned for a minimum of 15 hours at the specified test temperature prior to test. The items dropped in the 7-foot drop test were packaged in the standard LAW overpack except that only 2 or 3 test items were placed in each container with the remaining spaces filled with dummy systems. The test was performed in accordance with MTP 4-2-602 (Interim Pamphlet 70-96).

All drop testing was performed onto concrete-backed armor plate.

2.4.4 Results

The 7-foot drop test produced only nominal damage to the overpack containers which are fabricated from corrugated paperboard. The bump test produced no noticeable damage to the overpack or the launchers. The 5-foot drop test dented areas of the launchers. No damage to any of the test sights resulted from the rough handling test. Inspection with the G-M counter and wipe tests indicated that no radioactive substances escaped to the environment.

Following the firing phases of this test, inspection of the test sights revealed no physical damage and no release of radioactive material.

2.4.5 Analysis

The objective of this subtest was met and the sight met the requirements stated in the criterion.

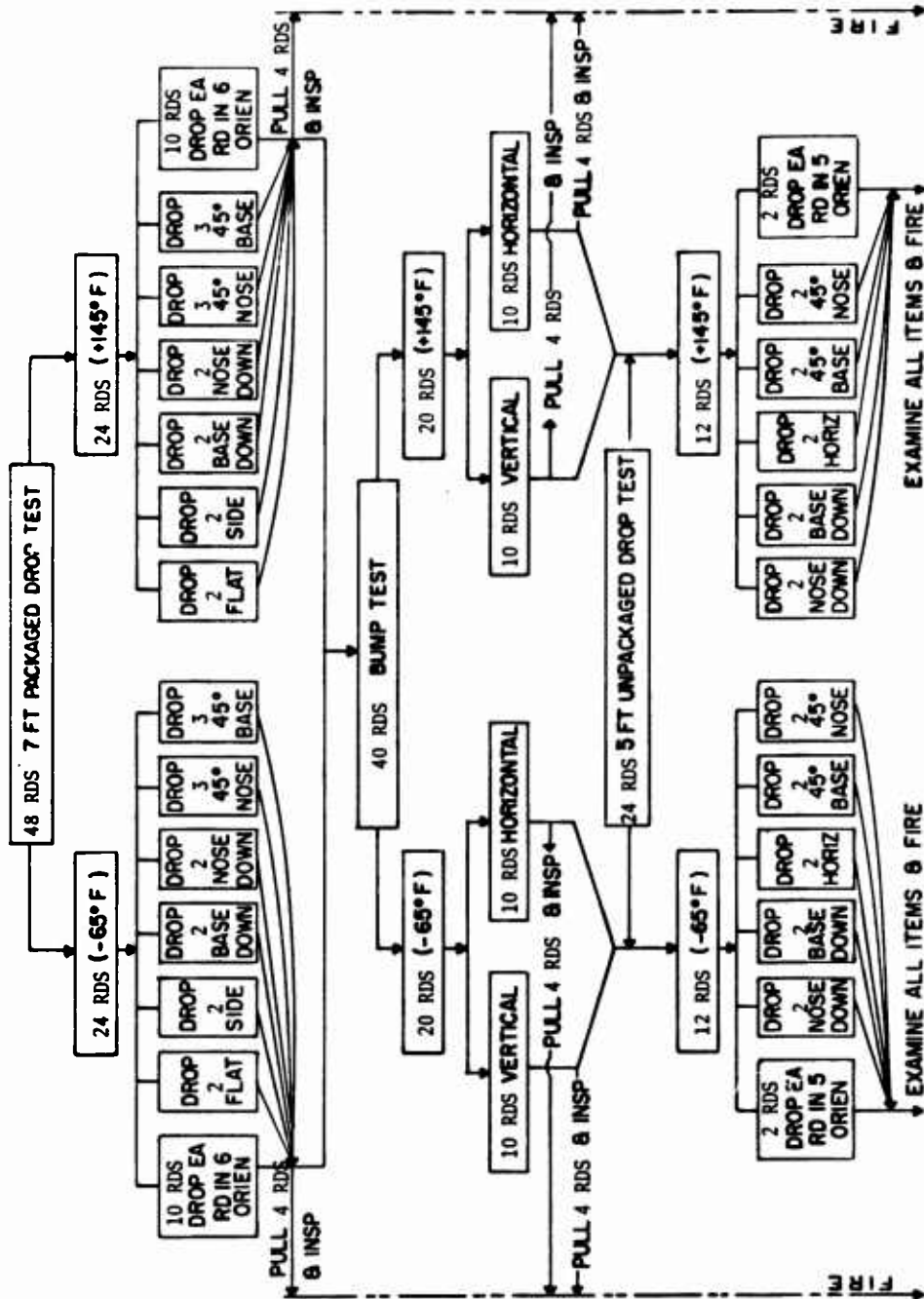


Figure 2.4-1: Rough Handling Outline.

2.5 FORTY-FOOT DROP

2.5.1 Objective

The objective of this subtest was to determine if the M46E1 sight on the M72A1 LAW could withstand a 40-foot drop and remain safe to handle.

2.5.2 Criterion

The sight shall be safe to handle for disposal purposes (MTD).

2.5.3 Method

Five LAW rockets with M46E1 sights were packed in each of 2 cardboard overpacks making a total of 10 test items. The 2 overpacks containing the test items plus an additional overpack containing dummy systems (weight) were packed in the standard shipping container. This shipping container was dropped from a height of 40 feet onto a concrete-backed steel plate in a random orientation impact.

The test items were examined for damage following the impact.

2.5.4 Results

The bottom of the wooden crate impacted the steel plate approximately 15° off the horizontal. The top and one side of the crate opened exposing the overpacks. The tape that secured the ends of the overpacks tore allowing the ends of the overpacks to open. An examination of the sights with a G-M survey meter and wipe test revealed no undue amount of radioactivity around the sights.

2.5.5 Analysis

The objective of this subtest was met and the sight complied with the requirements stated in the criterion (par. 2.5.2).

2.6 SALT SPRAY

2.6.1 Objective

The objective of this subtest was to determine the ability of the sight to resist the effects of a moist salt-laden atmosphere.

2.6.2 Criterion

The sight shall exhibit no unsafe condition following the 96-hour salt-spray test (MIL-STD-331).

2.6.3 Method

Ten bare test sights and ten standard sights were subjected to test in accordance with MIL-STD-331, Test No. 107. At the conclusion of the test, all sights were physically examined for deterioration and wipes were made of the 10 test sights.

2.6.4 Results

There was no physical damage to, or loss of radioactive material from, any of the sights after exposure to the salt-fog atmosphere.

2.6.5 Analysis

The objective of this subtest was met, and the sight complied with the requirements stated in the criterion (par. 2.6.2).

2.7 TEMPERATURE SHOCK

2.7.1 Objective

The objective of this subtest was to determine the ability of the sight to withstand the effects of sudden changes in temperature.

2.7.2 Criterion

The sight shall be safe and reusable and shall not in any way be deformed, changed, or otherwise altered as a result of this test (MIL-STD-331).

2.7.3 Method

Ten bare test sights and 10 standard sights were subjected to test in accordance with MIL-STD-331, Test No. 113. At the conclusion of the test, all sights were physically examined for deterioration and wipe tests were made of the test sights.

2.7.4 Results

There was no physical damage to, or loss of radioactive material from any of the sights after exposure to the temperature-shock test.

2.7.5 Analysis

The objective of this subtest was met and the sights complied with the requirements stated in the criterion (par. 2.7.2).

2.8 SAND AND DUST

2.8.1 Objective

The objective of this subtest was to determine the ability of the sight to withstand exposure to a sand and dust environment.

2.8.2 Criterion

The sight shall be safe and usable following this test (MIL-STD-331).

2.8.3 Method

Ten bare test sights and 10 standard sights were subjected to test in accordance with MIL-STD-331, Test No. 11b.

At the conclusion of the test, all sights were physically examined for deterioration and wipes were made of the test sights.

2.8.4 Results

There was deterioration in the clarity of the transparent plastic surfaces of the sights. The surface had a smokey gray appearance even after washing with soap and water. There was no loss of radioactive material from the test sights as a result of exposure to the sand and dust environment.

2.8.5 Analysis

The fogging of the surface of the sights, although rendering the plastic less transparent, did not cause the sight to be unusable. There was no loss of radioactive material as a result of this test; therefore, the M46E1 sight met the criterion of the sand and dust test (par. 2.8.2).

2.9 FUNGUS RESISTANCE

2.9.1 Objective

The objective of this subtest was to determine if the performance of the sight was adversely affected by a fungus environment.

2.9.2 Criterion

The sight shall be safe and usable following this test (MIL-STD-331).

2.9.3 Method

Ten bare test sights and 10 standard sights were subjected to test in accordance with MIL-STD-331, Test No. 110. At the conclusion of the test all sights were physically examined for deterioration and wipes were made of the test sights.

2.9.4 Results

The samples showed spotted traces of fungi on the surface of the sights, but it was easily wiped off and neither deterioration nor etching effects were noted on any surface of any sample. Viability controls showed abundant growth of fungi in the test chamber.

The results of wipe tests before and after the fungi test were negative.

2.9.5 Analysis

The M46E1 sight will not encourage the growth of fungi and will not be harmed by fungi growth. The sight met the criterion of the fungi test (par. 2.9.2).

2.10 HUMIDITY

2.10.1 Objective

The objective of this subtest was to determine if the sight could withstand the adverse effects of temperature fluctuations at high humidity.

2.10.2 Criterion

There shall be no deteriorating effect that inhibits the usefulness of the sight or renders it unsafe to handle or use (MTD).

2.10.3 Method

Ten bare test sights and 10 standard sights were subjected to test in accordance with MTP 4-2-820 (Interim Pamphlet 70-84), par. 4.2. At the conclusion of the test, all sights were physically examined for deterioration and wipes were made of the test sights.

2.10.4 Results

There was no physical damage to, or loss of radioactive material from any of the sights after exposure to the humidity test.

2.10.5 Analysis

The objective of this subtest was met and the sight complied with the requirements stated in the criterion (par. 2.10.2).

2.11 WEATHERING

2.11.1 Objective

The objective of this subtest was to determine the ability of the sight to withstand adverse weather conditions.

2.11.2 Criteria

The criteria are as follows:

- a. Any evidence of damage to, or a failure of, any device which could affect the containment of the promethium 147 in such devices shall be cause for rejection of the design of the device if damage or failure is attributable to design defect (AEC Rules and Regulations, Title 10, Part 32).
- b. If more than 0.1% of the original amount of promethium 147 in the sight is found in the water of the immersion test, or if more than 2200 disintegrations per minute of promethium 147 is measured on the filter paper used in wiping the entire surface of the sight after the test, the sight shall be rejected (AEC Rules and Regulations, Title 10, Part 32).

2.11.3 Method

USAEC Rules and Regulations, Title 10, Par. 32.40 a, states, "The device shall be subjected to 100 hours of accelerated weathering in a suitable weathering machine which simulates the most severe conditions of normal use." The tests described in par. 2.6 (salt spray), 2.7 (temperature-shock), 2.8 (sand and dust), 2.9 (fungus resistance), and 2.10 (humidity) satisfy this requirement.

2.11.4 Results

Following each of the subtests that constituted the weathering test, the test sights were in a satisfactory condition for use and had suffered no damage that released radioactive containments into the environment (pars. 2.6, 2.7, 2.8, 2.9, and 2.10).

2.11.5 Analysis

The objective of this subtest was met and the sight complied with the requirements stated in the criteria (par. 2.11.2).

2.12 SHOCK

2.12.1 Objective

The objective of this subtest was to determine the ability of the sight to withstand repeated shock.

2.12.2 Criteria

The criteria are as follows:

- a. Any evidence of damage to, or a failure of, any device which could effect the containment of the promethium 147 in such devices shall be cause for rejection of the design of the device if damage or failure is attributable to design defect (AEC Rules and Regulations, Title 10, Part 32).
- b. If more than 0.1% of the original amount of promethium 147 in the device is found in the water of the immersion test, or if more than 2200 disintegrations per minute of promethium 147 is measured on the filter paper used in wiping the entire surface of the device after the test, the device shall be rejected (AEC Rules and Regulations, Title 10, Part 32).

2.12.3 Method

Ten bare test sights were subjected to test in accordance with AEC Rules and Regulations, Title 10, Part 32, par. 32.40 b. At the conclusion of the test, all sights were physically examined for damage and wipes were made of the test sights.

2.12.4 Results

On drop No. 65, one sight developed a crack through one lamination approximately 1 inch below the location of the promethium 147. On drop No. 79, the piece of laminate below the crack separated from the main body of the sight. At the end of 100 drops, the sight with the crack had delaminated to a point 1/4 inch from the location of the promethium 147. However, the delamination process did not change after the 80th drop. On 4 other sights there were various degrees of delamination, none of which covered an area greater than 15% of the total laminated area. The delamination occurred at the base end of the sight away from the promethium 147. Although, the legs of the sights (used for mounting purposes) were broken off most of the sights and the corners were chipped, 5 of the sights showed no delamination.

2.12.5 Analysis

The objective of this subtest was met and the sight complied with the requirements stated in the criteria (par. 2.12.2).

2.13 VIBRATION

2.13.1 Objective

The objective of this subtest was to determine the ability of the sight to withstand a vibration environment.

2.13.2 Criteria

The criteria are as follows:

- a. Any evidence of damage to, or a failure of, any device which could effect the containment of the promethium 147 in such devices shall be cause for rejection of the design of the device if damage or failure is attributable to design defect (AEC Rules and Regulations, Title 10, Part 32).
- b. If more than 0.1% of the original amount of promethium 147 in the device is found in the water of the immersion test, or if more than 2200 disintegrations per minute of promethium 147 is measured on the filter paper used in wiping the entire surface of the device after the test, the device shall be rejected (AEC Rules and Regulations, Title 10, Part 32).

2.13.3 Method

Atomic Energy Commission Rules and Regulations, Title 10, Part 32, par. 3.40 c, states, "The device shall be attached to a vibratory fixture and vibrated at a rate of not less than 26 cycles per second a a vibration acceleration of not less than 2 g for a period of not less than 1 hour." The test described in par. 2.3 (transportation - vibration) satisfies this requirement.

2.13.4 Results

The test item was in a condition satisfactory for use and had suffered no damage that released radioactive materials into the environment following the vibration test described in par. 2.13.3.

2.13.5 Analysis

The test items successfully met the criteria of the vibration test.

2.14 IMMERSION TEST

2.14.1 Objective

The objective of this subtest was to determine the ability of the sights to withstand immersion in shallow water at reduced pressure.

2.14.2 Criterion

If more than 0.1% of the original amount of promethium 147 in the sight is found in the water of the immersion test, the sight shall be rejected (AEC Rules and Regulations, Title 10, Part 32).

2.14.3 Method

All bare test sights subjected to testing within this task were subjected to test in accordance with AEC Rules and Regulations, Title 10, Part 32, par. 32.40 d. At the conclusion of the immersion - vacuum test, the water samples in which the individual sights were immersed, were tested for evidence of radioactivity.

2.14.4 Results

There was no loss of radioactive material from any of the sights during the immersion - vacuum test.

2.14.5 Analysis

The objective of this subtest was met and the sight complied with the requirements stated in the criterion (par. 2.14.2).

CORRESPONDENCE

SMUPA-DC4 (27 June 69) 2nd Ind

Mr JMeyer/llm/328-2940

SUBJECT: Product Improvement Test of Limited Night Sight for M72A1 LAW
System, USATECOM Project No. 8-7-1800-16/17

DA, Picatinny Arsenal, Dover, New Jersey 07801

SEP 18 1969

TO: Commanding Officer, Aberdeen Proving Ground, Attn: STEAP-MT-TI,
Aberdeen Proving Ground, Maryland 21005

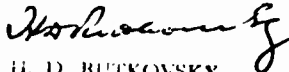
1. Reference: 1st Indorsement letter, SMUPA-DC4 dated 23 July 1969, Subj:
Proposed Plan Outline for Product Improvement Test of Night Sight for
M72A1 LAW, USATECOM Project No. 8-9-1800-16.

2. This Arsenal concurs in the deletion of the accuracy firing at dusk at
APG since Fort Benning will conduct a similar test.

3. Deletion of this phase was recommended by this Arsenal in above
referenced letter.

FOR THE COMMANDER:

Cy Furn
USATECOM APG
Attn: AMSTE-BC


H. D. RUTKOVSKY
Ch, Ammo Engr Lab

AMSTE-BC (27 Jun 69) 1st Ind
SUBJECT: Product Improvement Test of Limited Night Sight for M72A1
LAW System, USATECOM Project No. 8-7-1800-16/17

DA, Headquarters US Army Test & Evaluation Command, Aberdeen Proving
Ground, Maryland 21005 27 AUG 1969

TO: Commanding Officer, Picatinny Arsenal, ATTN: SMUPA-DC4, Dover,
New Jersey 07801

1. Reference letter, STEAP-MT-TI, dated 27 June 1969, subject: Proposed
Plan Outline for Product Improvement Test of Night Sight for M72A1 LAW.

2. This command has reviewed subject test program and suggests deletion
from referenced plan of the accuracy firings at dusk. This will reduce
quantity of test items required at the Aberdeen Proving Ground (APG) to
that requested by reference 1a of basic letter.

3. Your response direct to Commanding Officer, APG, ATTN: STEAP-MT-TI
with information copy to this command is requested.

FOR THE COMMANDER:



GOODWIN MORROW

Act Dir

Inf Mat Test Dir

SMUPA-DC4 (27 Jun 69) 1st Ind

Mr ALaCosta/ef/2940

SUBJECT: Proposed Plan Outline for Product Improvement Test of
Night Sight for M72A1 LAW, USATECOM Project No. 8-9-1800-16

DA, Picatinny Arsenal, Dover, New Jersey 07801

JUL 23 1969

TO: Commanding Officer, Aberdeen Proving Ground, ATTN: STEAP-MT-TI,
Aberdeen Proving Ground, Maryland 21005

1. Subject test plan has been reviewed by this Arsenal and approval is recommended with the following provisions:

a. Page 1, Transportation-Vibration Test - Method - Fifteen (15) LAW Systems are vibrated at each temperature instead of ten (10), as stated.

b. Page 6, Accuracy Comparison Test - Delete the Dusk phase since Ft. Benning will conduct similar test. Total of 80 systems stated during the Day schedule are assumed to be 40 standard systems and 40 systems with test sight. Twenty (20) each of both systems to be fired at 100 meters and 20 each of both systems to be fired at 150 meters.

2. Funds in the amount of \$33,500 have been sent to your Proving Ground, ATTN: STEAP-CO-P. PRON Number GG-9-28056-01-GG-K2 applies.

3. Elimination of the Dusk phase of the Accuracy Comparison Phase will affect the hardware requirements. Revised requirements should be as follows:

a. LAW System w/test sight w/inert warhead and live motor	118
b. LAW System w/test sight w/inert warhead and motor	10
c. LAW System w/standard sight w/inert warhead and live motor	40
d. Test sights	60
e. Standard sights	50

FOR THE COMMANDER:

wd Incl


H. D. RUTKOVSKY
Ch, Ammo Engr Lab



DEPARTMENT OF THE ARMY Mr. Kellberg/ms/231-1360-23286
ABERDEEN PROVING GROUND
ABERDEEN PROVING GROUND, MARYLAND 21005

STEAP-MT-TI

27 JUN 1969

SUBJECT: Proposed Plan Outline for Product Improvement Test of Night
Sight for M72A1 LAW, USATECOM Project No. 8-9-1800-16

Commanding Officer
Picatinny Arsenal
ATTN: SMUPA-DC4
Dover, New Jersey 07801

1. Reference: Letter, AMSTE-BC, 25 September 1967, Subject: Product Improvement Test of Night Sight, M46E1, for the M72 Light Antitank Weapon System, M72.

2. The test plan outline provided in the reference has been updated, at the request of USATECOM, and it is forwarded as Inclosure 1 for approval.

3. The estimated programming required to conduct this test is \$33,500. Request has been made through programming channels for the necessary program authorization.

4. The hardware requirements are as follows:

LAW system w/test sight w/inert warhead and live motor	153
LAW system w/test sight w/inert warhead and motor	10
LAW system w/standard sight w/inert warhead and live motor	80
Test sights	60
Standard sights	50

FOR THE COMMANDER:

1 Incl
as

R.P. Witt

R. P. WITT
Associate Director
Materiel Test Directorate

CF
CG, USATECOM, ATTN: AMSTE-BC, w/c incl

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TEST PLAN OUTLINE FOR NIGHT SIGHT FOR M72A1 LAW

Type Test	Objective	Criteria	Method	Sample Size	
				Systems Test Sight Std. Sight	Sights Test Standard
Initial Inspection	To determine the physical properties and condition of the test sights.	Sight shall be in a useable condition. (MTD)	The sights are examined for condition and a wipe test is performed.	All systems and sights.	
Hot and Cold Storage	To determine the susceptibility of the sight to damage upon exposure to extreme temperatures.	There shall be no adverse effects to the sights as a result of their exposure to extreme temperatures. (MTD)	Fifteen systems each are stored for 48 hours at temperatures of -65°F and 155°F prior to vibration test at these temperatures.	30L	
Transportation-Vibration	To determine the safety and usefulness of the sight after exposure to a simulated transportation vibration environment.	The sight shall remain safe to handle and functional after exposure to a transportation vibration environment. (MTD)	The systems involved in the hot and cold storage test are subjected to a vibration test in accordance with TECP 700-700, Interim Pamphlet 70-73. Ten LAW systems are vibrated at each temperature.	30L	The systems from the "Hot and Cold Storage" test are used in the transportation-vibration test.)

Type Test	Objective	Criteria	Method	Systems		Sights	
				Test Sight	Std. Sight	Test	Standard
Rough Handling	To determine the safety and operability of the sight after rough handling.	The sight shall remain safe and functional after exposure to a rough handling environment. (MTD)	Forty-eight LAW systems are subjected to a rough handling test in accordance with the schedule given in Figure 1.	48L	-	-	-
Forty-foot Drop	To determine the ruggedness and safety of the LAW sight.	The sight shall be safe to handle for disposal purposes. (MTL-STD-331)	Ten LAW systems are tested in accordance with MIL-STD-331, Test No. 103. Two test systems will be placed in each of five LAW overpacks. The remaining spaces in each overpack will be filled with dummy items.	10I	-	-	-
Weathering	To determine the ability of the sight to withstand adverse weather conditions.	Any evidence of damage to or a failure of any device which could affect the containment of the promethium 147	USAFEC Title 10, Para. 32.40(a). The following tests, i.e., salt spray, temperature-shock, sand and dust,	-	-	-	-

Type Test	Sample Size		Sights	
	Systems	Test Sight	Std. Sight	Test Standard
Weathering (Cont'd)	Objective	Criteria	Method	
		in such devices shall be cause for rejection of the design of the device if damage or failure is attributable to design defect. (U.S.A.E.C. Rules & Regulations, Title 10, Part 32)	fungus resistance and temperature-humidity, will be accepted as fulfilling the USAEC requirement.	
		If more than 0.1 percent of the original amount of promethium 147 in the sight is found in the water of the immersion test, or if more than 2200 disintegrations per minute of promethium 147 is measured on the filter paper used in wiping the entire surface of the sight after the test, the sight shall be rejected. (U.S.A.E.C. Rules and Regulations, Title 10, Part 32)		

Type Test	Objective	Criteria	Method	Sample Size		
				Systems		
				Test Sight	Std. Sight	Sights Test Standard
a. Salt Spray	To determine the ability of the sight to resist the effects of a moist salt-laden atmosphere.	The sight shall be safe following the 96 hour salt spray test. (MIL-STD-331)	Ten test sights and ten standard sights are subjected to test in accordance with MIL-STD-331, Test No. 107.	-	-	10 10
b. Temperature Shock	To determine the ability of the sight to withstand the effects of sudden changes in temperature.	The sight shall be safe and useable and shall not in any way be deformed, changed, or otherwise altered as a result of this test. (MIL-STD 331)	Ten test sights and ten standard sights are subjected to test in accordance with MIL-STD-331, Test No. 113.	-	-	10 10
c. Sand and Dust	To determine the ability of the sight to withstand exposure to a sand and dust environment.	The sight shall be safe and useable following this test. (MIL-STD-331)	Ten test sights and ten standard sights are subjected to test in accordance with MIL-STD-331, Test No. 116.	-	-	10 10
d. Fungus Resistance	To determine if the sight performance is adversely affected by a fungus environment.	The sight shall be safe and useable following this test. (MIL-STD-331)	Ten test sights and ten standard sights are subjected to test in accordance with MIL-STD-331, Test No. 110.	-	-	10 10

Type Test	Objective	Criteria	Method	Sample Size			
				Systems		Sights	
				Test Sight	Std. Sight	Test	Standard
e. Humidity	To determine if the sight can withstand the adverse effects of temperature fluctuations at high humidity.	There shall be no deteriorating effect that inhibits the usefulness of the sight or renders it unsafe to handle a use. (MTD)	Ten test sights and ten standard sights are subjected to test in accordance with TECP 700-700, Interim Pamphlet 70-84, Para. 4.2.	-	-	10	10
Shock	To determine the ability of the sight to withstand repeated shock.	Same as Weathering Test.	USAE Title 10, Part 32, Para. 32.40(b).	-	-	10	-
Vibration	To determine the ability of the sight to withstand a vibration environment.	Same as Weathering Test.	USAE Title 10, Part 32, Para. 32.40(c). The preceding transportation-vibration test performed under TECP 700-700, Interim Pamphlet 70-73, will be accepted as fulfilling the USAEC requirement.	-	-	-	-

Type Test	Objective	Criteria	Method	Sample Size		
				Systems		Sights
				Test Sight	Std. Sight	Test Standard
Immersion	To determine the ability of the sights to withstand immersion in shallow water at reduced pressure.	If more than 0.1 percent of the original amount of promethium 147 in the sight is found in the water of the immersion test, the sight shall be rejected. (USAFEC Title 10, Part 32)	USAFEC Title 10, Part 32, Para. 32.40(d). This test is performed on all test sights (but not systems) after each test prescribed in this test plan outline.	-	-	All test sights are test-d.
Accuracy Comparison	To determine the accuracy of the test sight as compared with the standard sight.	The test sight shall be at least as accurate as the standard sight. (MTD)	The following test firing schedule will be used: -Dusk- Range, Meters Temp. 100 150 140°F 10 10 -40°F 10 10 Ambient 20 20	80L	80L	-

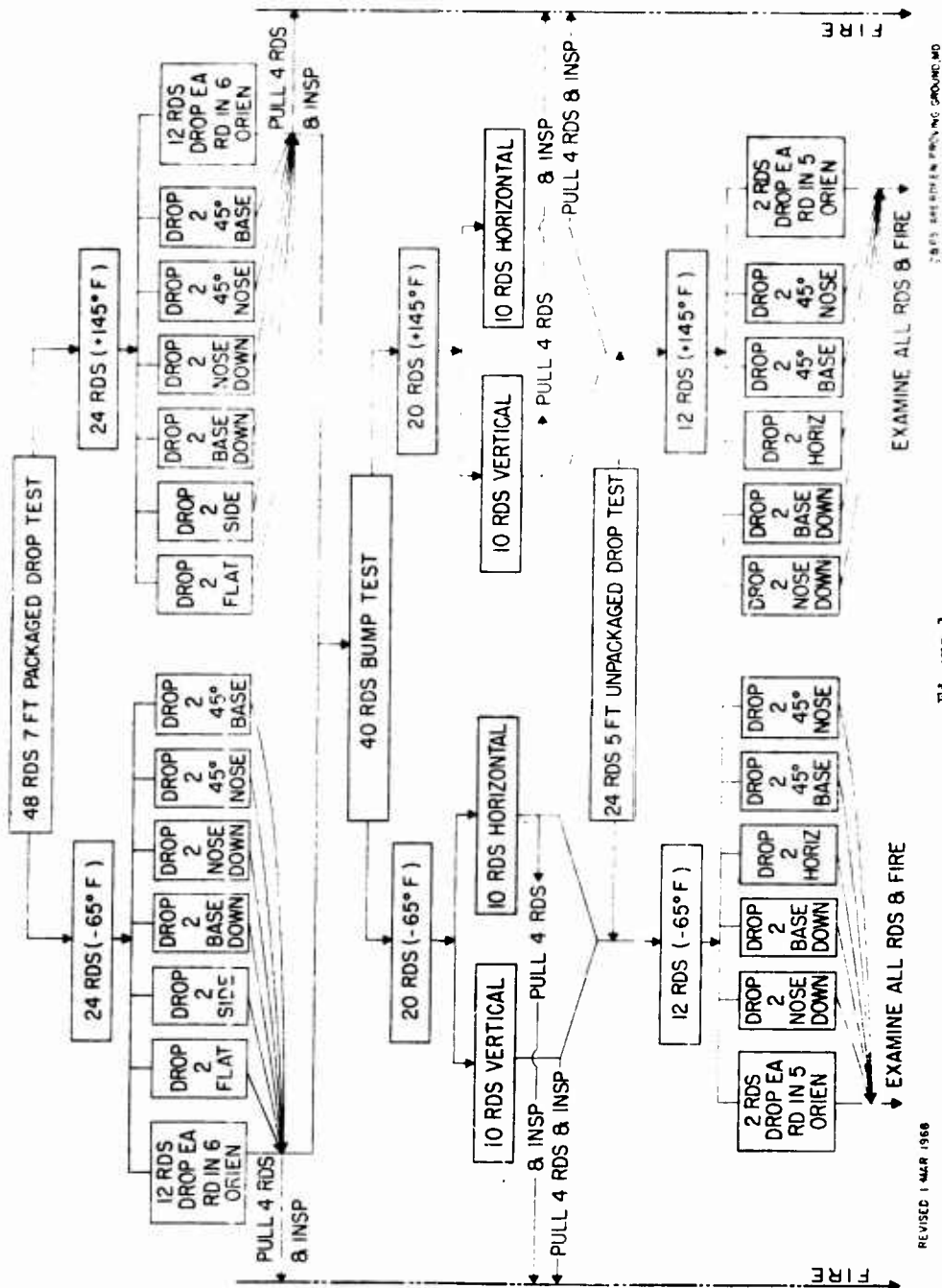
-Day-		
Range, Meters		
Temp.	100	150
140°F	10	10
-40°F	10	10
Ambient	20	20

NOTE: A wipe test will be performed on each test sight (both the individual sights and those mounted on the LAW system launchers) in accordance with USAFEC regulations following each of the tests performed in this test plan. The wipe test will precede any immersion tests conducted. Criteria for the wipe test is the same as that portion of the criteria that pertains to the wipe test under the Weathering test.

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ARTILLERY AMMUNITION

(PROPOSED)





DEPARTMENT OF THE ARMY Mr. Kellberg/ma/231-1360-23286
ABERDEEN PROVING GROUND
ABERDEEN PROVING GROUND, MARYLAND 21005

JEP 469

STEAP-MT-TI

SUBJECT: Product Improvement Test of Limited Light Sight for M72A1
LAW System, USATECOM Project No. 8-WE-307-072-001

Commanding Officer
U. S. Army Edgewood Arsenal
ATTN: Quality Assurance Directorate
Edgewood Arsenal, Maryland 21010

1. The Materiel Test Directorate, Aberdeen Proving Ground has the responsibility of conducting a Product Improvement Test on a Limited Light Sight for the M72A1 Rocket System (LAW). One subtest in the test plan requires that the bare sight be subjected to a fungus resistance test in accordance with MIL-STD-331, Test No. 110. The proving ground does not have this capability.

2. Request that the Quality Assurance Directorate (QAD), conduct the fungus test and provide a brief laboratory report with the test results.

3. Preliminary discussions have been held with Mr. Anthony Sinclitico, QAD. The test item will be supplied to QAD upon request and if possible the test should be completed prior to 30 November 1969.

FOR THE COMMANDER:

R. P. WITT
Associate Director
Materiel Test Directorate

SMUEA-QAIC (18 Sep 69) 1st Ind
SUBJECT: Product Improvement Test of Limited Light Sight for M72A1
LAW System, USATECOM Project No. 8-WL-307-072-001


DA, HQ, Edgewood Arsenal, Edgewood Arsenal, Maryland 21010

TO: Commanding Officer, Aberdeen Proving Ground, ATTN: STEAP-MT-TI,
Aberdeen Proving Ground, Maryland 21005

Fungus tests have been performed on subject item, (QA Dir Log Number
8399), and results are being forwarded as requested.

FOR THE COMMANDER:

1 Incl
as (2 cy)
1 cy upd


A. N. SINCLITICO
Chief, Inspection Operations Division
Quality Assurance Directorate

LOG NO. 8399

SUBJECT: Product Improvement Test of Limited Light Sight for M72A1
LAW System, USATECOM Project No. 8-WE-307-072-001

1. The Fungus Resistance Test No. 110 of MIL-STD-331 was conducted on 10 samples of Limited Light Sights with radioactive spots and on 10 samples without. After completion of the 28-day incubation period (7 Oct 69 - 5 Nov 69), the samples were examined for the presence of fungi. Although the samples showed spotted traces of fungi on the surface of the sights, it was easily washable and neither deterioration nor etching effects were noted on any surface of any sample. The appearance of traces of fungi on the surface of the samples is not a cause of rejection and the fungus resistance properties of the material are considered to be good.
2. Viability controls were simultaneously run on filter paper - a material known to support the growth of fungi. These controls showed abundant growth of mildew indicating that the fungi used for the test were viable.



DEPARTMENT OF THE ARMY
PICATINNY ARSENAL
DOVER, NEW JERSEY 07801

Mr. TLaCosta/bj/328-2940

SMUPA-DCL

NOV 13 1969

SUBJECT: Product Improvement Test of Limited Light Sight for M72A1
LAW System, USATECOM Project No. 8-7-1800-16/17

Commanding Officer
Aberdeen Proving Ground
Attn: STEAP-MT-TI
Aberdeen Proving Ground, Maryland 21005

1. Reference: Telephone conversation Mr. Comer APG and Mr. LaCosta PA on 4 November 1969, Subject: same as above.
2. Per reference telephone conversation this Arsenal concurs in the deletion of the accuracy firing portion of subject test.
3. Both the standard sight and limited light sight are dimensionally identical, except for thickness, and both sights are set and aligned in the same manner and same setting fixture, therefore, no difference in accuracy is anticipated.

FOR THE COMMANDER:

D. D. Rutkovsky
D. D. RUTKOVSKY
Ch, Ammo Engr Lab

Unclassified

Security Classification

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(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

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11. SUPPLEMENTARY NOTES None		12. SPONSORING MILITARY ACTIVITY PA	
13. ABSTRACT The product improvement test of the M72A1 LAW was performed to evaluate the safety of the M46E1 night sight. The weapon with the night sight was environmentally tested to determine if release of the radioactive material would occur during severe conditions which may be experienced during use. Testing was performed from October through November at Aberdeen Proving Ground, Maryland. Tests were performed in accordance with MIL-STD-331, Materiel Test Procedures, and Title 10, Part 32, of the Atomic Energy Rules and Regulations. The sight was found to be safe for use under extreme climatic and rough handling environments.			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

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14.	KEY WORDS	LINK A		LINK B		LINK C	
		ROLE	WT	ROLE	WT	ROLE	WT
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